SGW-40896
Revision 2

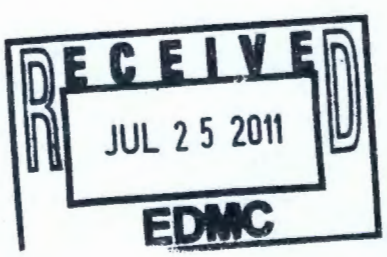
Air Monitoring Plan for Waste Site Remediation in the 100-K Area

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

CH2MHILL
Plateau Remediation Company

P.O. Box 1600
Richland, Washington 99352



SGW-40896
Revision 2

Air Monitoring Plan for Waste Site Remediation in the 100-K Area

Date Published
July 2011

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

P.O. Box 1600
Richland, Washington

Release Approval 07/20/2011
Date

Approved for Public Release:
Further Dissemination Unlimited

SGW-40896, Rev. 2, *Air Monitoring Plan for Waste Site Remediation in the 100-K Area*

T. K. Teynor, K-Basin Closure Project
Federal Project Director
U.S. Department of Energy,
Richland Operations Office

July 14, 2011
Date

R. A. Lobos, Unit Manager
Hanford Project Office,
U.S. Environmental Protection Agency

July 14, 2011
Date

Contents

Terms

ALARA	as low as reasonably achievable
APQ	annual possession quantity
ARAR	applicable or relevant and appropriate requirement
BARCT	Best Available Radionuclide Control Technology
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
HPT	health physics technician
MEI	maximally exposed individual
PNNL	Pacific Northwest National Laboratory
PTE	potential-to-emit
RL	U.S. Department of Energy, Richland Operations Office
TEDE	total effective dose equivalent
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
WAC	*Washington Administrative Code*
WIDS	waste information data system

1. Introduction

This air monitoring plan supports the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (DOE/RL-96-17) for remediation of the 100-K Area Waste Sites located inside the fence and on the floodplain. This revision incorporates the following changes made to Revision 0:

- Changes made to the 100-K Area Near Facility ambient air monitoring network, *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1989) change notices (TPA-CN-318 and TPA-CN-319) for relocation of near-facility ambient air monitors currently supporting the 100-K Area *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) remedial action to support ongoing and future facility demolition and soil remediation activities.
- Changes made to the potential-to-emit (PTE) estimate. Instead of using estimates based on soil contamination levels, the curies associated with the waste information data system (WIDS) site at 105-KE Basin are assumed to be bounding for all the remaining sites for remediation within the 100-K Area since all the combined curie inventory of the 100-K Area remediation sites is less than the 105-KE Basin boundary estimates. The curie values for105-KE Basin boundary are based on WIDS information (SGW-40896, Rev. 0) and are considered bounding for the remaining 100-K Area waste sites. Although the project lifetime is listed as 6 years, it is assumed all the curies would be addressed within one year for calculating the offsite dose consequences.
- Changes made to the radionuclide air monitoring activities supporting the 100-K Area remediation work. A paragraph has been added which details additional monitoring that will be performed consisting of a combination of radiological contamination field surveys for removable alpha and beta-gamma activity, and work place air monitoring.

2. Radiological Air Emissions

The State implementing regulation Washington Administrative Code (WAC) 173-480, "Ambient Air Quality Standards and Emission Limits for Radionuclides," sets standards that are as stringent or more so than the federal standards under the *Clean Air Act of 1990* and Amendments (42 United States Code 7401 et seq.), and under the Federal implementing regulation, 40 Code of Federal Regulations (CFR) 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities." U.S. Environmental Protection Agency (EPA) partial delegation of the 40 CFR 61 authority to the State of Washington includes all substantive emissions monitoring, abatement, and reporting aspects of the federal regulation. The State standards protect the public by conservatively establishing exposure standards applicable to even the maximally exposed public individual, be that individual real or hypothetical. To that end, the standards address any member of the public, at the point of maximum annual air concentration in an unrestricted area where any member of the public may be. All combined radionuclide airborne emissions from the U.S. Department of Energy (DOE) Hanford Site "facility" are not to exceed amounts that would cause an exposure to any said member of the public of greater than 10 mrem/yr effective dose equivalent. The State implementing regulation WAC 246-247, "Radiation Protection – Air Emissions," which adopts the WAC 173-480 standards and the 40 CFR 61, Subpart H standard, requires verification of compliance with the 10 mrem/yr standard, and would be applicable or relevant and appropriate to this remedial action.

The WAC 246-247 addresses emission sources emitting fugitive or diffuse radioactive airborne emissions by requiring monitoring of such sources. Such monitoring requires physical measurement of the effluent or ambient air, and quality assurance measures to assure the precision, accuracy, and completeness of the

environmental measurements. The substantive provisions of WAC 246-247 that require monitoring of radioactive airborne emissions would be applicable or relevant and appropriate to this remedial action.

The above State implementing regulations further address control of radioactive airborne emissions where economically and technologically feasible [WAC 246-247-040(3) and -040(4), "Radiation Protection Air Emissions," "General Standards," and associated definitions]. To meet the substantive aspect of these requirements, best or reasonably achieved control technology will be applied by ensuring that applicable emission control technologies (those successfully operated in similar applications) will be used when economically and technologically feasible (i.e., based on cost/benefit). If it is determined that there are substantive aspects of the requirement for control of radioactive airborne emissions, then controls will be administered as appropriate using reasonable and effective methods.

3. Criteria/Toxic Air Emissions

Under WAC 173-400, "General Regulations for Air Pollution Sources," and WAC 173-460, "Controls for New Sources of Toxic Air Pollutants," requirements are established for the regulation of emissions of criteria/toxic air pollutants. The primary nonradioactive emissions resulting from this remedial action will be fugitive particulate matter. In accordance with WAC 173-400-040, "General Standards for Maximum Emissions," reasonable precautions must be taken to (1) prevent the release of air contaminants associated with fugitive emissions resulting from excavation, materials handling, or other operations; and (2) prevent fugitive dust from becoming airborne from fugitive sources of emissions. The use of treatment technologies that would result in emissions of toxic air pollutants that would be subject to the substantive applicable requirements of WAC 173-460 are not anticipated to be a part of this remedial action. Treatment of some waste encountered during this remedial action may be required to meet Environmental Restoration Disposal Facility (ERDF) waste acceptance criteria. In most cases, the type of treatment anticipated would consist of solidification/stabilization techniques such as macroencapsulation or grouting, and WAC 173-460 would not be considered an applicable or relevant and appropriate requirement (ARAR). If more aggressive treatment is required that would result in the emission of regulated air pollutants, the substantive requirements of WAC 173-400-113(2) and WAC 173-460-060 would be evaluated to determine applicability.

Emissions to the air will be minimized during implementation of this remedial action through use of standard industry practices such as the application of water sprays, fixatives, and wind speed dependent work restrictions. These techniques are considered to be reasonable precautions to control fugitive emissions as required by the regulatory standards.

4. Radiological Airborne Source Information

There is a potential for particulate radionuclide airborne emissions to result from the remedial action activities. The total potential fugitive and diffuse emissions were estimated to be less than those for remediation of the WIDS site at 105-KE Basin boundary. A conservative estimate of potential airborne release was assured by use of the WAC 246-247-030(21)(a) method for estimating the airborne fraction of material excavated or otherwise handled. One part in one thousand of all curies involved in the remedial action was assumed released to the ambient air. Resultant potential exposure to the maximally exposed individual (MEI) of the public was then estimated using dose factors calculated from CAP88-PC runs (EPA 402-R-00-004).

The primary representative radionuclides comprising the combined total curie values within the UPR-100-K-1, 100-K-69, 100-K-70 and a portion of the 100-K-53, 100-K-68 and 100-K-71 waste sites located within the 105-KE Basin boundary are considered bounding for these and all remaining sites to be remediated within 100-K Area located inside the fence and on the floodplain. The total estimates are

1.3E+02 curies of americium-241 and 3.1E+03 curies of cesium-137 as shown in Table 1. These bounding estimates are based on WIDS information for sites within the 105-KE Basin boundary and the known operating history and contamination history of those sites. The combined curie inventory of the 100-K Area sites remaining to be remediated inside the fence and on the floodplain is less than the 105-KE Basin boundary estimates as discussed in Section 1.

This project is expected to take 6 years to complete, however, it is assumed all the annual possession quantity (APQ) would be addressed within one year. The exposure risk will be minimized during this time frame by backfilling as work progresses, thereby keeping the work-related emissions as low as reasonably achievable (ALARA) by keeping exposed areas of contamination minimized.

The distance to the MEI is 8,900 meters north-northwest of the 100-K East Area. This location represents the nearest unrestricted public access and therefore the MEI for purposes of assessing potential public exposure due to airborne releases. The total estimated unabated emissions in terms of PTE could result in up to 4.8 mrem/yr total effective dose equivalent (TEDE) to the MEI (DOE/RL-2006-29). Although effective controls will be utilized, for conservatism the unabated emissions are also assumed to represent the abated emissions. Because the PTE is greater than 0.1 mrem/yr TEDE to the MEI, continuous emissions monitoring is required as discussed in Section 6.

Table 1. Dose Calculations for the Remediation of Remaining Waste Sites in the 100-K Area

Isotope[a]	APQ Ci[b]	WAC 246-247-30(21)(a) Release Factor	PTE (Ci/yr)[c]	Abated Emissions (Ci/yr)[d]	Dose Factor (mrem/Ci)[e]	Unabated Effective Dose (mrem/yr TEDE)[f]	Abated Effective Dose (mrem/yr TEDE)[g]
Am-241	1.3E+02	1.0E-03	1.3E-01	1.3E-01	2.5E+01	3.3E+00	3.3E+00
Cs-137+Progeny	3.1E+03	1.0E-03	3.1 E+00	3.1E+00	4.7E-01	1.5E+00	1.5E+00
Total						4.8E+00	4.8E+00

a. All alpha emitters are conservatively represented as Am-241 and all beta/gamma emitters are conservatively represented as Cs-137+Progeny.

b. Ci = Ci values for 105-KE Basin boundary, which are based on WIDS information (SGW 40896, Rev. 0) and are considered bounding for the remaining 100-K Area waste sites. Although the project lifetime is listed as 6 years, it is assumed all APQ would be addressed within one year.

c. PTE (Ci/yr) = APQ Ci•[WAC 246-247-030(21)(a) Release Factor for liquids or particulate solids].

d. Abated Emissions (Ci/yr) = PTE (assuming no credit for abatement efficiencies).

e. Dose Factor Source: DOE/RL-2006-29, *Calculating Potential-to-Emit Radiological Releases and Doses,* Table 4-7 for 100-K Area, effective release height <40 m for onsite MEI.

f. Unabated Effective Dose (mrem/yr TEDE to the MEI)=[PTE (Ci/yr)]•[Dose Factor (mrem/Ci)].

g. Abated Effective Dose (mrem/yr TEDE to the MEI)=[Abated Emissions (Ci/yr)]•[Dose Factor (mrem/Ci)].

5. Emission Controls

As a new and significant activity with regard to potential for airborne radionuclide emissions, the removal action will be subject to the substantive provisions of the Best Available Radionuclide Control Technology (BARCT) standard. Due to the straightforward (i.e., excavation type) methods utilized for the removal action, and the allowance in the standard for cost benefit based case-by-case feasibility in the BARCT evaluation process, straightforward BARCT analysis was performed with regard to the potential for emissions associated with these short term cleanup-oriented excavations. Research and operational experience has shown the methods bulletized below to be very effective in reducing and minimizing emissions. Specific citations of studies showing the effectiveness of these methods across the DOE Complex are found in the following:

- *Fixative Analysis for Soil Stabilization Activities at Hanford (Task #3)* (ARC 1997)
- *Demonstration of DeconGel ™ at the Oak Ridge National Laboratory Building 2026* (ORNL 2009)
- *Environmental Assessment and (FONSI) for Mound Plant Decontamination and Decommissioning Projects* (EA-683)
- *233-S PCF Demolition Project, RadCon Practices and Techniques* (SRS 2004)
- *Open Air Demolition of Radiological Contaminated Structures* (FH 2008).

In addition, Hanford experience and ongoing operations have demonstrated that the listed available methods, systems, and techniques for the control of radionuclide emissions represent the most effective control technology from among all known feasible alternatives, and represent the required level of BARCT for the subject removal action. Recent and successful application of these controls at Hanford cleanup projects has included the BC Cribs Characterization, 100 Area soil cleanup, TRU Waste Retrieval Project, 300 Areas soil cleanup, and 212-N, -P, and -R Facilities cleanup each demonstrating excellent radionuclide controls with no measurable impact to any member of the public, be they real or hypothetical maximally exposed individuals.

In general, the BARCT evaluation for the outdoor, relatively short-term removal actions supports use of proven technology. Based on analysis of the potential emissions and consideration of all available and feasible control technologies, the following controls have been selected for use during the removal action.

- Health physics technician (HPT) coverage will be provided as described for these types of excavations in the Hanford Sites radiological control manual of standard practices. This coverage allows for close monitoring of field conditions during the cleanup work, and requires ALARA control of airborne material.
- Water sprays and/or fogging will be applied, as needed, during any excavation and backfilling activities, for suppression of fugitive emissions and dust.
- Water and or chemical-based fixatives will be applied to contaminated soil and/or debris and equipment, as needed, to minimize airborne contamination during the remedial action activities for fugitive emissions and dust. Fixative application techniques may include spraying, brushing on, pouring or some other method, as necessary. Due to the high tack and soil binding nature of the fixatives, they provide greater suppression of the soil matrix and reduce the amount of particle movement when exposed to wind forces of 10-30 mph.

- Fixatives or cover material (e.g., soil, gravel, etc.) will be applied to disturbed contaminated soils associated with the remedial action, when field activities will be inactive more than 24 hours except as noted in the next bullet.
- If the sustained wind speed is predicted overnight to be greater than 32 km/hr (20 mph) based on the Hanford Meteorological Station morning forecast, fixative or cover material will also be applied, as needed. This will allow the project enough time, if necessary, to prepare for the application of dust control measures. If a fixative has already been applied and the contaminated items will remain undisturbed, further use of fixatives will not be needed. The fixatives or other controls will not be applied when the contaminated soil surface is frozen, or it is raining, snowing, or other freezing precipitation is falling at the end of work operations.
- Field activities will be temporarily ceased and the area will be placed in a safe configuration if contamination control measures are not adequate, based on site conditions (e.g., excessive wind).
- The waste packages will remain closed, except during packaging and waste inspection activities, once they are staged, within the CERCLA Area of Contamination or the CERCLA Waste Management Area.
- Operational limits for removable or transferable contamination levels will be established in the activity work packages and associated radiation work plans. Fixatives or other controls will be employed if removable or transferable contamination levels (other than specks of contamination) above 100,000 disintegrations per minute per 100 cm^2 beta/gamma or exceeding 2,000 disintegrations per minute per 100 cm^2 alpha are measured or expected. Work will be suspended when either airborne contamination levels are reached or remediation activities cause the migration of dust and or waste from posted contamination area.
- The area of highly-contaminated soil exposed at any one time will be minimized.
- Excavation activities will be stopped if removable or transferable contamination (other than specks of contamination) with detection readings greater than 500,000 disintegrations per minute per 100 cm^2 beta/gamma or greater than 28,000 disintegrations per minute per 100 cm^2 alpha is encountered on the soil outside of active work areas posted for contamination control. The size of the posted area at any one time will be minimized to facilitate contamination control and the area stabilized. Excavation in that area will not continue until an internal review of the work and encountered conditions has been performed and an internal determination has been made that no threat to personnel safety or the environment exists, or until proper controls (i.e., removal and disposal, water, fixatives, or covers) have been put in place to mitigate any further potential for emissions, and EPA and DOE, Richland Operations Office (RL) have been contacted and briefed of the situation.
- The ambient air 2-week sampling results for gross alpha and beta will be trended and checked for statistical elevations greater than 3 standard deviations above the mean (> 3 sigma). If greater than 3 sigma results are realized, then administrative and/or engineered contamination controls, for the activities ongoing during the time frame of the sampling period, shall be reviewed for adequacy. If warranted, modifications to the controls shall be implemented.

6. Monitoring

The calculated unabated annual dose combined for all related activities during the remedial action is 4.8 mrem/yr TEDE to the MEI. Therefore, this activity is subject to emissions monitoring in accordance with the substantive requirements of WAC 246-247-075(1). Fugitive and diffuse emissions monitoring

with applicable quality assurance will be provided, reflecting the substantive requirements of WAC 246-247-075(8). Near facility monitors and radiological field surveys are sufficient to meet the continuous monitoring requirement.

The 100-K Area Near-Facility ambient air monitoring network will be used for continuous monitoring since the PTE is greater than 0.1 mrem/yr TEDE to the MEI. These monitors will be operated equivalent to those in the 200 Area Near-Facility Monitoring Network already approved for major source monitoring of fugitive/diffuse emissions. Near-facility monitoring is performed in the 105-KE/105-KW Basins locale as part of the Hanford Site Near-Facility Monitoring Program, described in the *Environmental Monitoring Plan* (DOE/RL-91-50, latest revision) to monitor ambient air quality as may be impacted by localized fugitive/diffuse radionuclide emissions. This existing network of near-facility ambient air monitoring stations is maintained in the 100-K Area to address U.S. DOE requirements (as described in the referenced plan) which are separate from requirements under this remedial action. The latest Near-Facility Monitoring Program direction is to replace the 8 currently operating ambient air monitoring stations very near the 105-KE/105-KW Basins with a perimeter of 6 stations, each within a radius of roughly 500 m from the footprint of the combined facilities as shown in Figure 1. One existing ambient air monitoring station operated by Pacific Northwest National Laboratory (PNNL) and within the 500m arc will provide data utilized for the Near-Facility Monitoring Program. In addition, as noted in Figure 1, one ambient air monitor will be added approximately midway between the 105-KE and 105-KW Buildings. While additional adjustment in the number or location of these monitoring stations may occur to support the Near-Facility Monitoring Program, it will be assured that no less than three of these air monitoring stations will remain within the 100-K Area locale as part of the Near-Facility Monitoring Program for the duration of the remedial action project at waste sites within the 100-K Area. Any outage of the ambient air monitoring stations will be corrected as expeditiously as practicable.

In addition, if one of the Near-Facility Program air monitors at 100-K Area is out of operation for more than 48 hours during normal work operations (excluding weekends and holidays, when work activities are not being conducted), where there is a potential for radiological airborne emissions, RL and EPA will be notified. If two of the Near-Facility Program air monitors at 100-K Area are out of operation during normal work operations, activities where there is a potential for radiological airborne emissions shall be temporarily suspended until operation of at least one of the two designated air monitors is restored or backup equipment is deployed and operational.

As part of the sitewide evaluation of near facility monitoring data, the electronic release summary database compares near-facility monitoring composite air sample results to 10% of the 40 CFR 61, Appendix E, Table 2 values. The database identifies results that exceed these values. Results from the air monitors identified in this document that are above these values will be reviewed, the adequacy of the controls evaluated as appropriate, and RL and EPA will be notified.

Using a graded approach, additional monitoring for diffuse and fugitive emissions may be conducted in place of using hand held instruments during excavation activities at radiologically contaminated waste sites. The additional monitoring may consist of a combination of radiological contamination surveys for removable alpha and beta-gamma activity, and work place air monitoring. Work progress contamination surveys may be performed adjacent to contamination area boundaries during active remediation to monitor for contamination spread, as needed. Contamination surveys adjacent to contamination area boundaries during active remediation are performed several times per shift, if warranted. Periodic contamination surveys are performed, when needed, on those portions of the heavy equipment working within the posted contamination areas (e.g., track-hoe buckets, demolition hammers, and pipe cutting shears) to ensure removable contamination levels are below the limiting conditions of the applicable

Radiation Work Permit. Contamination surveys on those portions of the heavy equipment within the contamination area are normally performed once per shift.

Using a graded approach, workplace air monitoring may be conducted during soil excavation and structure demolition activities performed in radioactively contaminated waste sites. Low volume air samplers with the sample head positioned adjacent to the excavator bucket and/or demolition hammer may be mounted on heavy equipment performing soil remediation during excavation, loading out of waste material, and concrete demolition, if needed. In addition, air samples may be collected in downwind positions along the contamination area boundary of waste sites undergoing remediation. Lapel air samplers may be worn by personnel entering areas that are monitored for occupational exposure to airborne radioactivity when workplace air samplers are determined to be non-representative of active work areas (i.e., not close enough to the workers or in the wrong position to be representative of the breathing zone air activity).

Following completion of the remedial action, monitoring data will be reviewed to verify the approved emission levels were not exceeded.

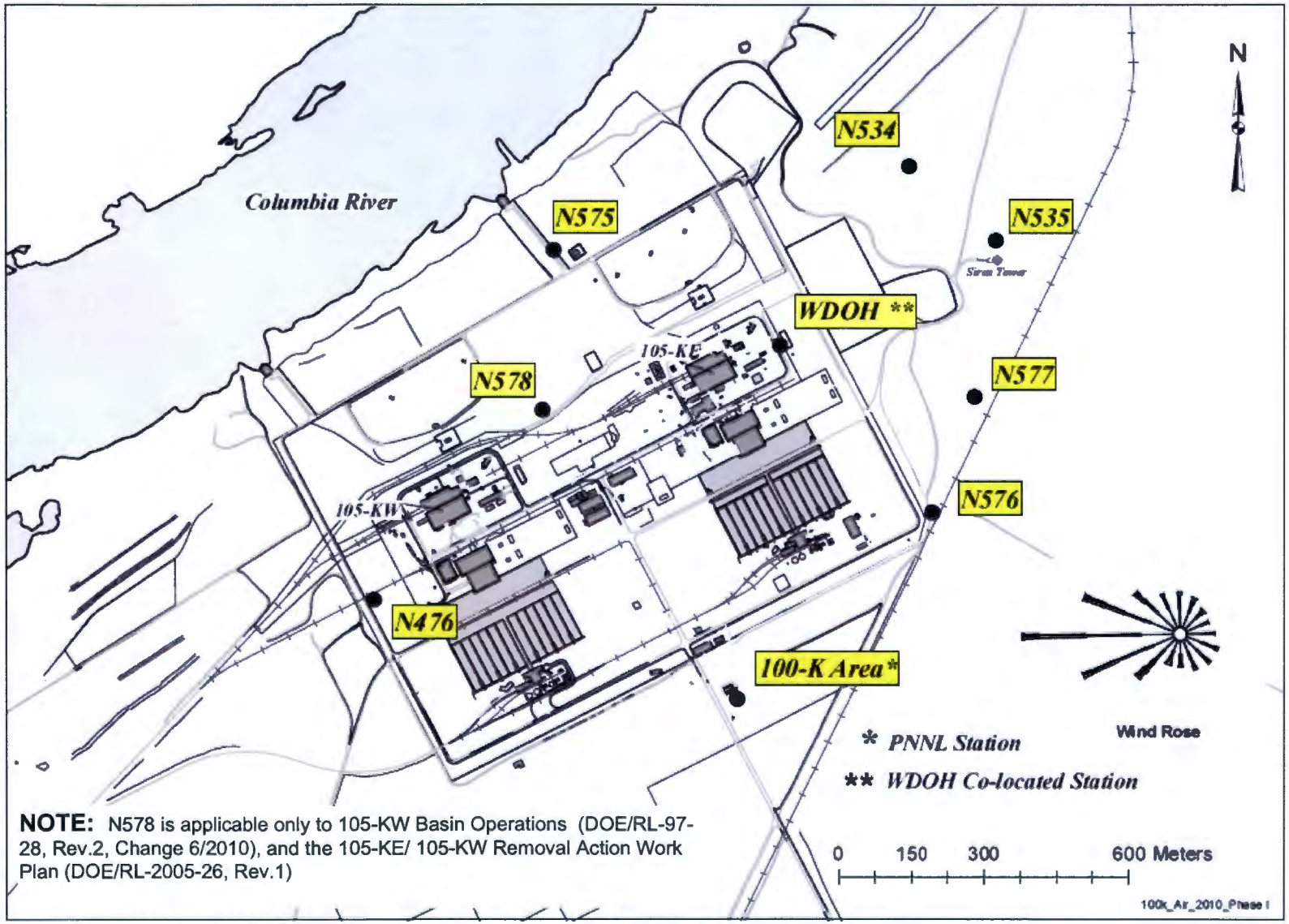


Figure 1. Locations of Ambient Air Monitoring Stations

7. References

40 CFR 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities," *Code of Federal Regulations*. http://www.epa.gov/radiation/neshaps/subparth/index.html

ARC, 1997, *Fixative Analysis for Soil Stabilization Activities at Hanford (Task #3)*, August 22, 2007, Applied Research Center (ARC), Florida International University, Miami, Florida. Available at http://www.orau.gov/ddsc/ret/Richland-Fixatives.pdf

Clean Air Act of 1990, 42 U.S.C. 7401, et seq. http://www.epa.gov/air/caa/

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. 9601, et seq. http://www.epa.gov/superfund/policy/cercla.htm

DOE/RL-2006-29, 2006, *Calculating Potential to Emit Radiological Releases and Doses*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at http://www2.hanford.gov/arpir/?content=findpage&AKey=0904290337.

DOE/RL-96-17, 2009, *Remedial Design Report/Remedial Action Work Plan for the 100 Area*, Rev. 6, U.S. Department of Energy, Richland Operations Office, Richland, WA. Available at http://www2.hanford.gov/arpir/?content=findpage&AKey=0095436 .

DOE/RL-91-50, 2008, *Environmental Monitoring Plan*, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at http://www.pnl.gov/ecomon/docs/DOE-RL-91-50_Rev4.pdf

EA-683, *Environmental Assessment and (FONSI) for Mound Plant Decontamination and Decommissioning Projects*. Available at http://www.globalsecurity.org/wmd/library/report/enviro/ea0683.html#389

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington. Available at http://www.hanford.gov/?page=81

EPA 402-R-00-004, *Updated User's Guide for CAP88-PC, Version 2*, U.S. Environmental Protection Agency, Office of Radiation and Indoor Air, March 2000. http://www.epa.gov/rpdweb00/docs/cap88/402-r-00-004.pdf

FH, 2008, *Open Air Demolition of Radiological Contaminated Structures (05/11/2007)*. Hanford Site, Richland, Washington. Available at http://www.efcog.org/bp/p/doc/BP54.pdf

ORNL, 2009, *Demonstration of DeconGel™ at the Oak Ridge National Laboratory Building 2026*, 02/2009, Oak Ridge National Laboratory - Tennessee. Available at http://decongel.com/documents/DeconGelProductDemonstrationatOakRidgeNationalLab.pdf

SRS, 2004, *233-S PCF Demolition Project, RadCon Practices and Techniques*. Available at http://www.srs.gov/general/programs/alara/233_s.pdf

SGW-40896, Rev. 0, *Air Monitoring Plan for the Waste Sites Near 105-KE Basin in the 100-K Area*, CH2M HILL Plateau Remediation Company, Richland, Washington. Available at http://www2.hanford.gov/arpir/?content=findpage&AKey=1001140040

WAC 173-400, "General Regulations for Air Pollution Sources," *Washington Administrative Code*. http://apps.leg.wa.gov/WAC/default.aspx?cite=173-400

WAC 173-460, "Controls for New Sources of Toxic Air Pollutants," *Washington Administrative Code*. http://apps.leg.wa.gov/WAC/default.aspx?cite=173-460

WAC 173-480, "Ambient Air Quality Standards and Emission Limits for Radionuclides," *Washington Administrative Code*. http://apps.leg.wa.gov/WAC/default.aspx?cite=173-480

WAC 246-247, "Radiation Protection – Air Emissions," *Washington Administrative Code*. http://apps.leg.wa.gov/WAC/default.aspx?cite=246-247